Forest Health Protection
Pacific Southwest Region

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To: Dave Meyers, Forest Supervisor, Shasta-Trinity National Forest

Subject: Trip report following honeybee neutralization at Weaverville Ranger Station

At the request of Josiah McElroy, Shasta-Trinity Engineering, a site visit was made to the Weaverville Ranger Station on July 8, 2016, where a large hive of honeybees had taken residence in the wall of the Engineering shed over the past several years. The objective was to provide entomological guidance in neutralizing the honeybees so that the hive could be rescued and re-homed in the local area. Josiah McElroy (Shasta-Trinity NF), Tony Miller, David Nelson (private bee keepers), and Cynthia Snyder (FHP) were present.

Background

The western honeybee, or European honeybee (*Apis mellifera*), is the most common of the more than 40 species of honeybee worldwide. It was introduced to North America in the early 1600's and has since spread throughout the continent. The western honey bee is the primary species maintained by beekeepers for both its honey and pollination services. Due to its wide cultivation, this species is the single most important pollinator for agriculture globally. A number of pests and diseases threaten the honey bee, especially colony collapse disorder.

The honeybee is eusocial with individual colonies housing tens of thousands of bees. Each colony has a single fertile female (queen), a small proportion of fertile males (drones), and many sterile females (workers). Honeybees do not build an external structure that contains their hive as do many wasp species. They live in hollow spaces, such as a hollow tree, a traditional man-made bee hive, or sometimes inside the wall cavities of buildings. They build large wax combs inside the hive made of perfect little hexagon-shaped cells. Bees store everything from eggs, to pollen, to honey in these cells.

In the temperate zone, honey bees survive winter within the hive. The queen begins egg-laying in mid- to late winter. She deposits each egg in a cell prepared by worker bees. The egg hatches into a small larva fed by nurse bees (worker bees who maintain the interior of the colony). After about a week, the larva is sealed in its cell by the nurse bees to pupate. After another week, it emerges as an adult bee.

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Worker bees secrete the wax used to build the hive, clean, maintain and guard it, raise the young and forage for nectar and pollen. For the first few weeks of their lives, female worker bees clean the hive, feed the larvae, and build comb cells. Workers then leave the hive and spends the remainder of their lives as foragers. The average population of a healthy hive in midsummer may be as high as 40,000 to 80,000 bees. Colony activities are organized by complex communication between individuals, through both odors (pheromones) and a unique dance language.

The average lifespan of a queen is three to five years, the lifespan of workers varies considerably over the year. Workers born in spring and summer will work hard, living only a few weeks, but those born in autumn will remain inside the colony for several months. On average during the year, about one percent of a colony's worker bees die naturally per day.

Observations

The hive was located on the north-facing wall of the Engineering shed (Figure 1) in the back of the Weaverville Ranger Station. The bees had gained access to the interior of the wall through gaps in the siding as well as holes in the boards (Figure 2). It was said that the bees had been in the walls for several, perhaps up to 20, years.

Figures 1 and 2. The hive was located on the north-facing wall of the Engineering shed. Bees were able to get in through gaps in the siding as well as holes in the siding boards.

The actual hive, both old and new comb, took up nearly 2,400 cubic inches of space in the upper wall cavity (approximately 30 x 4 x 20 inches). The active part of the hive was in a state of rapid expansion as workers continued to make wax cells to house new brood and store food. It was estimated that there were about 50,000 bees in the hive.

Honeybees will actively seek out and sting when they perceive the hive to be threatened. The larger drone bees do not have stingers. The female worker bees are the only ones that can sting, and their stinger is a modified ovipositor. The queen bee has a smooth stinger and can, if need be, sting skin-bearing creatures multiple times, but the queen does not leave the hive under normal conditions. Her sting is not for defense of the hive; she only uses it for dispatching rival queens, ideally before they can emerge from their cells. The stinger of the worker bee is barbed and will become stuck in the skin of the victim when the worker is forced to defend herself or the hive. The bee is unable to pull it out, and

dies when she inevitably tears herself away from the stuck stinger, however, the tearing also leaves behind the venom sack still pumping venom into the victim.

It is the defense of the hive that brought the attention of the Engineering department. The sting may be painful for a few hours. Swelling and itching may persist for a week. For about 2 percent of people, a hypersensitivity can develop after being stung, creating a more severe reaction when stung again later. This sensitisation may happen after a single sting, or after a series of stings where they reacted normally. A highly allergic person may suffer anaphylactic shock, which can be life-threatening and requires emergency treatment. Many people in the Forest Service are known to be allergic to bee venom and knowingly leaving a large hive within the work area may put many people at risk. However, there was a great deal of reluctance to remove the bees previously as many individuals had strong feelings regarding their presence and feared the only option was killing the colony with pesticides.

Discussion

The honey bee is one of our most beneficial insects and we should do all we can to protect bee colonies. The annual contribution of honey bees to food production, through pollination, in the United States is estimated to be $10 billion. In June 2014, President Obama released a memorandum creating a Federal Strategy to Promote the Health of Honey Bees and Other Pollinators. This Strategy established the Pollinator Health Task Force to be co-chaired by the Secretary of Agriculture and the Administrator of the Environmental Protection Agency. The Task Force created a strategy that includes an Action Plan focusing Federal efforts on understanding, preventing, and recovering from pollinator losses, coordinating public education programs, outlining steps individuals and businesses can take to help address the loss of pollinators, and developing public-private partnerships to build on Federal efforts to encourage the protection of pollinators. This makes it incumbent upon the Forest Service to not only protect the Weaverville employees but also protect the pollinators in this case.

Neutralization is a process where the bees, all living and dead, are removed from the wall. Access was gained through use of skill saw and saws-all. The exposed hive was then cut from the wall structures and placed carefully in an awaiting hive box. The key to removal was finding the queen and placing her in the hive box so that her pheromones would start to concentrate there and attract the colony to her new location. The following picture run (Figures 3-14) illustrates the steps taken to neutralize the bees and successfully move the hive to a new location within the Weaverville area by the team of Josiah McElroy and bee keepers, Tony Miller and David Nelson.

Figures 3 and 4. Josiah cutting the siding.

Figures 5 and 6. Removing the siding to expose the hive combs.

Figures 7 and 8. Cutting and removing the combs.

Figures 9 and 10. Placing the combs with the queen into the hive box.

Figures 11 and 12. Continue removing siding until all of the comb has been removed. Then collecting bees by hand to place into the hive box.

Figures 13 and 14. Placing bees in the hive box and covering to concentrate queen pheromones and allow workers to reorient to the hive box for fanning.

The honeybees were successfully attracted to the new hive and moved to a new home outside of the Weaverville compound. Thanks to the efforts of Josiah McElroy.

Figure 14. Josiah, Tony and David in full bee suits.

If you have any questions regarding this report and/or need additional information, please contact Cynthia Snyder at 530-226-2437.

/s/ Cynthia Snyder

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